Claims

1. Expandable tubular joint comprising, on the one hand, a first tubular element (EM) comprising a first part (P1), provided with a male thread (FM), and a second part (P2) extending said first part and comprising i) a first outer surface (SE1), ii) a first annular lip (L1) having a first axial abutment surface (SB1) and a first inner surface (SI1) and delimited by said first outer surface (SE1) over a part of the axial length thereof, and iii) a second abutment surface (SB2), and, on the other hand, a second tubular element (EF) comprising i) a female thread (FF), matching the male thread (FM) and screwed thereto, ii) a second annular lip (L2) having a third abutment surface (SB3), a second outer surface (SE2), arranged to face said first inner surface (SI1), and a second inner surface (SI2), iii) a fourth axial abutment surface (SB4), and iv) a third inner surface (SI3) extending between said fourth axial abutment surface (SB4) and said female thread (FF) and defining with said second outer surface (SE2) and fourth abutment surface (SB4) an annular recess (LO) matching said first lip (L1), characterised in that said first tubular element (EM) comprises a selected local annular added thickness (SA1) in the region of a fourth inner surface (SI4) extending the second abutment surface (SB2), in that said second tubular element (EF) comprises, at a selected location of its third inner surface (SI3), an inner annular groove (G1) arranged substantially in the region of said first outer surface (SE1) and of said annular added thickness (SA1), and in that said first (EM) and second (EF) tubular elements are shaped in such a way that said first lip (L1) is accommodated in said annular recess (LO), and said second abutment surface (SB2) rests against said third abutment surface (SB3) and/or said first abutment surface (SB1) rests against said fourth abutment surface (SB4) so as to allow, during a diametral expansion in the plastic deformation region subsequently carried out on the expandable tubular joint, the formation, in the region of said first outer surface (SE1), of an annular shoulder (EP) having at least a part of the shape of the groove (G1) and being in sealing interference contact therewith.

2. Joint according to claim 1, characterised in that said first (EM) and second (EF) tubular elements are shaped in such a way that, after said expansion, another sealing interference contact is defined between an inner end part of said first lip (L1) and said second outer surface (SE2).

3. Joint according to either claim 1 or claim 2, characterised in that said first tubular element (EM) initially has a local annular added thickness (SA1) increasing in the direction of said second abutment surface (SB2).

4. Joint according to claim 3, characterised in that said local annular added thickness (SA1) increases substantially continuously at a slope between approximately 5° and approximately 30° and preferably between approximately 10° and approximately 20°.

5. Joint according to any one of claims 1 to 4, characterised in that said first tubular element (EM) initially has in the region of its first portion (P1), over its inner surface opposing said male thread (FM), a conical neck in which is defined a local annular set-back (DC2).

6. Joint according to claim 5, characterised in that said neck grows substantially continuously at a slope relative to the longitudinal direction (A) of between approximately 2° and approximately 20°.

7. Joint according to any one of claims 1 to 6, characterised in that said maximum added thickness (SA1) of the second portion (P2) is initially less than a value selected as a function of a diameter of a drift.

8. Joint according to any one of claims 1 to 7, characterised in that said second inner surface (SI2) of the second lip (L2) initially has a selected local annular added thickness (SA2) in a zone adjacent to said third abutment surface (SB3), so as to increase the deformation of said first lip (L1) in the direction of said groove (G1) during the expansion.

9. Joint according to claim 8, characterised in that said added thickness (SA2) of the second lip (L2) is less than the added thickness (SA1) of the first tubular element.

10. Joint according to either claim 8 or claim 9, characterised in that said added thickness (SA2) of the second lip (L2) is initially less than a value selected as a function of a diameter of a drift.

11. Joint according to any one of claims 1 to 10, characterised in that said second tubular element (EF) initially has a ratio between the extension (PR) of its second lip (L2) in the longitudinal direction and the extension (H) of its recess (LO) in a transverse plane of between approximately 1 and approximately 3 and preferably between approximately 1.2 and approximately 1.6.

12. Joint according to any one of claims 1 to 11, characterised in that said groove (G1) initially comprises at least two curvilinear portions (C1, C2).

13. Joint according to claim 12, characterised in that said curvilinear portions (C1, C2) initially have substantially identical radii of curvature.

14. Joint according to claims 13, characterised in that said radius of curvature is initially between approximately 2 mm and approximately 20 mm.

15. Joint according to any one of claims 12 to 14, characterised in that the two curvilinear portions (C1, C2) are separated by a substantially cylindrical central portion (PC).

16. Joint according to any one of claims 12 to 15, characterised in that at least one of the tubular elements (EM, EF) forms part of a great length tube (T1, T2) and in that said groove (G1) initially has a radial depth (H'), the maximum value of which is selected such that the material section at the bottom of the groove (G1) is greater than the product of the smallest section of a common portion of said tube or tubes (T1, T2), and the efficiency of the joint under tension.

17. Joint according to any one of claims 1 to 16, characterised in that said male (FM) and female (FF) threads are selected from a group consisting of conical-type and cylindrical-type threads and are each formed over at least one tubular element portion (EM, EF).

18. Joint according to any one of claims 1 to 17, characterised in that said first (EM) and second (EF) tubular elements are shaped in such a way that, after screwing, said first lip (L1) is axially compressed in the elastic deformation region.

19. Joint according to any one of claims 1 to 18, characterised in that said first (EM) and second (EF) tubular elements are shaped in such a way that, during said screwing, said first abutment surface (SB1) rests against said fourth abutment surface (SB4), then said second abutment surface (SB2) rests against said third abutment surface (SB3).

20. Joint according to claim 19, characterised in that said second (SB2) and third (SB3) abutment surfaces initially have convex and concave conical surfaces respectively, having substantially identical inclinations relative to a plane transverse to the longitudinal direction (A) so as to allow a sealing interference contact between said first inner surface (SI1) and said second outer surface (SE2) after said screwing and prior to said expansion.

21. Joint according to claim 20, characterised in that said inclinations are initially between approximately +5° and approximately +30°.

22. Joint according to any one of claims 1 to 21, characterised in that said first inner surface (SI1) of the first lip (L1) is initially inclined relative to said longitudinal direction (A) by an angle of between approximately 0.1° and approximately 15°.

23. Joint according to any one of claims 1 to 22, characterised in that said male (FM) and female (FF) threads initially comprise threads provided with a carrier flank having a negative angle of between approximately –3° and approximately –15°.

24. Joint according to any one of claims 1 to 23, characterised in that said male (FM) and female (FF) threads initially comprise threads provided with a stabbing flank having a positive angle of between approximately +10° and approximately +30°.

25. Joint according to claim 24, characterised in that said male (FM) and female (FF) threads have, after screwing and prior to expansion, an axial clearance between their stabbing flanks of between approximately 0.05 mm and approximately 0.3 mm.

26. Joint according to any one of claims 1 to 25, characterised in that said first tubular element (EM) initially has, in the region of its first outer surface (SE1) and before its first portion (P1), a conical chamfer defining a local annular set-back (DC1) toward the interior.

27. Joint according to claim 26, characterised in that said chamfer has a substantially continuous slope relative to the longitudinal direction (A) of between approximately 8° and approximately 12°.

28. Joint according to any one of claims 1 to 27, characterised in that the second outer surface (SE2) of the second lip (L2) initially has, in the region of its connection to said third abutment surface (SB3), an annular portion inclined relative to said longitudinal direction (A) by an angle of between approximately 8° and approximately 12° and preferably equal to approximately 10°.

29. Joint according to any one of claims 1 to 28, characterised in that said first tubular element (EM) is provided with a first rounded outer surface (SE1).

30. Joint according to any one of claims 1 to 29, characterised in that said second tubular element forms part of a substantially symmetrical female/female-type connection sleeve (M) and said first tubular element (EM) forms part of an end of a great length tube.

31. Joint according to claim 30, characterised in that said sleeve (M) comprises a central portion (PCM) extended on either side by two second tubular elements (EF1, EF2) and initially provided, over an outer surface, with an annular zone (G2) having a reduced thickness selected such that the initial thickness of said sleeve (M) in the region of this zone (G2) is greater than or equal to the product of the section of a common portion of the tubes (T1, T2), at the ends of which are formed said first tubular elements (EM), and the efficiency of the joint.

32. Method for producing an expanded tubular joint, characterised in that it consists, based on an expandable tubular joint according to any one of the preceding claims,

– in screwing said first (EM) and second (EF) tubular elements until the second abutment surface (SB2) rests against the third abutment surface (SB3) and/or the first abutment surface (SB1) rests against the fourth abutment surface (SB4) and said first lip (L1) is accommodated in said annular recess (LO), and

– in subjecting said expandable tubular joint to a diametral expansion in the plastic deformation region, so as to define, in the region of said first outer surface (SE1), an annular shoulder (EP) having at least a portion of the shape of the groove (G1) and being in sealing interference contact therewith.

33. Method according to claim 32, characterised in that said expansion defines another sealing interference contact between an inner end portion of said first lip (L1) and said second outer surface (SE2).

34. Method according to either claim 32 or claim 33, characterised in that said screwing firstly forces said first abutment surface (SB1) to be pressed against said fourth abutment surface (SB4) so as to cause said first lip (L1) to be subjected to axial compression in the elastic deformation region.

35. Method according to any one of claims 32 to 34, characterised in that said screwing is carried out until said first abutment surface (SB1) rests against said fourth abutment surface (SB4), then until said second abutment surface (SB2) rests against said third abutment surface (SB3).

36. Method according to any one of claims 32 to 35, characterised in that the radial expansion of the joint takes place at an expansion rate at least equal to 10%.